SIEMENS

SIREMOBIL Compact

SP

Maintenance Instructions

System

SIREMOBIL Compact to serial no.: 01999

The protocol RXR2-130.105.01.05.02 is required for these instructions

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1 General Information

1.1 Requirements

The requirements described in chapter 1 of the Service Instructions also apply to maintenance.

1.2 Required Documents

- Safety information according to ARTD, part 2
- Service protocol RXR2-130.105.01..
- Service instructions RXR2-130.061.01..
- Image Quality quick test RXR2-130.037.01..
- Technical Safety Checks (TSC)* SP00-000.834.01...

* Within the purview of DIN VDE 0751-1, we recommend documenting the results of the maintenance both in the maintenance protocol and in the TSC protocol. The protocols should be filled out completely and handed over to the client after maintenance is complete.

1.2.1 Systems equipped with SIMOMED N X 2080 monitor

- Maintenance check list Z35
- Adjustment Instructions RX52-060.061.02..

1.2.2 Systems equipped with an I.I. laser light localizer

- Installation and Setting Instructions RXR2-130.033.03..

1.2.3 Systems equipped with a laser light localizer

- Laser Light Localizer Setting Instructions RXR2-130.032.01..

1.2.4 Systems equipped with Codonics printer

- Codonics printer EP 1660 Installation and Setting Instructions SPR2-130.814.01

1.3 Required tools, measurement and auxiliary devices

NOTE

The indicated articles are listed in the STC (Service Tools Catalog) unless otherwise stated (the STC is a component of the Spare Parts Catalog), except for those items identified with "*".

Tool	For example	Material no.:
• Standard tool kit*		
• Set of Allen wrenches*		
• Spring balance rated for up to 200 N		44 15 113 RH090
• Leakage current measurement device	Safety tester Unimet 1100	51 38 727
• Protective conductor meter	Safety tester Unimet 1100	51 38 727
• Internal line resistance meter		84 28 104 Y4337
• DVM	Fluke 187	99 94 831
• Luminance meter	e.g., SPOTMETER for SMfit ACT	77 52 848
• Densitometer (if MULTISPOT 2000 option is available)		97 02 416 Y1996
• Dose meter	PTW Diados	97 17 612 Y0388
• Dynamic test kit		37 90 156 X1963
• Precision X-ray filter		99 00 598 XE999
• Set of resolution tests		28 71 820 RE999
• Set of radiation filters (10 x 0.3 mm)		44 06 120 RV090
• Set of radiation filters		97 98 596 G5321
• 25 mm AL measuring stand, type 26765 acc. to DIN 6868 Part 50* or 1.2 mm Cu (e.g., from set of radiation filters 44 06 120) plus		
• 17 Micrometer Cu strip		11 67 662
• Centering cross (only with Diamentor)		96 60 051 RE999
• Service PC		
• Cable for connecting service PC to host		99 00 440 RE999
• Service software*	(see logbook)	

Tool	For example	Material no.:
• Sealing compound		34 43 009
• Special oil (Viscogen kl 300)		73 95 353

1.4 Spare parts which may be needed

- Cable deflector steering castor large / SIREMOBIL stand
- Cable deflector wheels small / SIREMOBIL stand
- Conductive rubber / SIREMOBIL stand and monitor trolley
- Touch-up paint 34 44 403
- Spray paint 84 27 734 RH999

1.5 Emphasized text

⚠DANGER	**DANGER indicates when there is an immediate danger that l e a d s to death or serious physical injury.**
⚠WARNING	**WARNING indicates a risk of danger that m a y l e a d to death or serious physical injury.**
⚠ CAUTION	**CAUTION used with the safety alert symbol indicates a risk of danger that leads to slight or moderate physical injury and/ or damage to property.**
NOTICE	**NOTICE used without the safety alert symbol indicates a risk of danger that if disregarded leads or may lead to a potential situation which may result in an undesirable result or state other than death, physical injury or property damage.**

Fig. 1: Safety Notes

1.6 Safety information

1.6.1 General safety information (in existing documents)

⚠WARNING

Danger of injuries, death or material damage.

Note

- **the product-specific safety notes in these instructions,**
- **The general safety information in TD00-000.860.01... and**
- **the safety information in accordance with ARTD part 2.**
- **Non-compliance can lead to death, injury or material damage.**

1.6.2 General electrical safety information

⚠WARNING

Electrical safety!

Non-compliance can lead to severe injury or even death and material damage.

- **After opening the cover panels, the parts under voltage are accessible. To avoid danger, disconnect the system from the power supply prior to opening the covers. Pull out the power supply plug.**
- **If an uninterruptible power supply (UPS) is installed in the system, the voltage output of the UPS must also be deenergized or the voltage output plug must be disconnected.**
- **If work has to be performed under electrical voltage, the general safety information according to TD00-000.860.01... must be complied with.**

⚠CAUTION

Electrical voltage!

Non-compliance can result in material damage.

- **When working on the system, ESD regulations must be observed.**

1.6.3 Radiation safety information

⚠WARNING

X-ray radiation!

Non-compliance can lead to illness, irreversible damage to body cells and the genotype, severe injury and even death.

When performing work on the system during which radiation must be released, the radiation protection directives and the rules for radiation protection according to ARTD 02.731.02 must be complied with.

- **Please note:**
- **Use available radiation protection devices.**
- **Wear radiation protection clothing (lead apron).**
- **Stay as far away as possible from the radiation source.**
- **Release radiation only if necessary.**
- **Set the radiation activity as low as possible. (low kV and mA values, short radiation time)**
- **Release radiation for as short a time as possible.**
- **Checks in which radiation must be released are identified by the radiation warning symbol.**

1.6.4 Mechanical safety information

⚠CAUTION

Risk of burns from hot parts or components! If not observed, minor to more severe burns, especially on the hands, can occur.

Parts and components (e.g., power components, cooling fins, electromagnetic brakes) that can exceed 50 degrees Celsius during operation are accessible after the covers are opened.

- **To avoid burns, switch the system off prior to touching parts or components and allow at least 5 minutes of cooling.**

⚠CAUTION

Risk of injury from mechanical parts! If not observed, minor to more severe injury, especially to the hands, can occur.

Parts such as flat plugs, threaded bolts, cut-off cable ties and component edges that, if care is not taken, can cause crushing, abrasion and cuts to the skin, particularly to the hands, can be touched after the covers are opened.

- **Perform the required work with special care and attention to detail.**
- **If needed, wear working gloves.**

1.6.5 Safety information - risk of infection

⚠WARNING

Risk of infection due to pathogens! Non-compliance can lead to severe injury and even death.

This product can be contaminated by infected blood or other bodily fluids.

- ➪ **Avoid all contact with blood or other bodily fluids!**
- ➪ **Strictly observe the safety information in ARTD-002.731.37... regarding prevention of infectious diseases during customer service calls.**

1.6.6 Laser light localizer option

NOTICE

Laser emissions!

Non-compliance can result in injury, in particular to the retina, and consequently in irreversible sight damage.

This product contains class 2 lasers.

(USA: class 2 laser).

- ➪ **Observe the safety warnings of ARTD-002.731.03. Do not look directly into the laser beam when using the laser light localizer.**

NOTE

The eye is not in immediate danger.

(Eye blinking reflex)

Nevertheless, do not look directly into the laser beam.

1.7 Information on the protective conductor resistance test

Observe the instructions in the safety rules for installation and repair (ARTD-002.731.17 ...).

The protective conductor resistance is to be measured, documented, and evaluated during maintenance.

NOTE

Evaluate the results by comparing the first measured value to the corresponding values documented during preceding maintenance procedures or safety checks.

A sudden or unexpected increase in the measured values may indicate a defect in the protective conductor connections - even if the limit value of 0.2 Ohms is not exceeded.

(Protective conductor or contacts).

The measurement must be performed according to DIN VDE 0751, part 1 (see ARTD part 2). In this case the protective conductor resistance for all touchable conductive parts must be measured during the normal operating state of the system.

Make sure that control cables or data cables between the components of the system are not mistaken for a protective conductor connection.

During the measurement the power cable and additional connection cables which also make the ground wire connection between parts of the system (e.g., monitor cable between C-arm chassis and monitor trolley) must be moved section by section to detect broken conductors.

The protective conductor resistance must not exceed 0.2 Ohms.

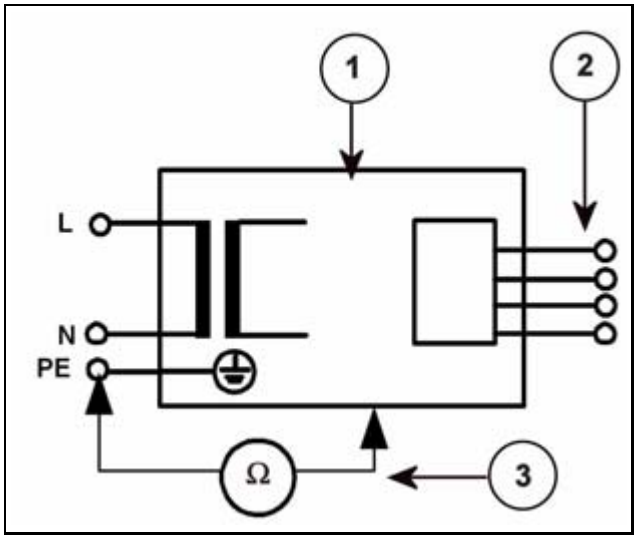

Fig. 2: Measuring circuit for measuring the protective conductor resistance in units/systems that are permanently connected to the power supply net (according to DIN VDE 0751-1:2001-10, Fig. C3).

Pos. 1 System

Pos. 2 Application part (not available)

Pos. 3 Measurement setup (integrated into measuring device)

The determined values, including the measuring points, must be recorded and assessed in the protective conductor resistance report.

The measuring procedure and the measuring device used (designation and serial number) are also to be documented.

1.7.1 Information on measuring the system leakage current

NOTE

The system leakage current measurement is to be conducted and recorded as the repeat measurement during maintenance.

However, the first measured value must be newly determined and a new report must created under the following conditions:

Lack of system leakage current measurement documentation

Local line voltage or line frequency deviating from the line voltage and line frequency documented in the report (e.g., in the event of a site/operator change)

Use of a different procedure for measuring the system leakage current from the one documented in the report.

For the purpose of traceability, reference to the new report is to be written on the old report. The reason for newly determining the first measured value is to be documented and confirmed with a name and signature.

Observe the instructions in the safety rules for installation and repair (ARTD-002.731.17 ...).

⚠WARNING

Electrical voltage!

Non-compliance can lead to severe injuries and even death.

➪ **The system leakage current measurement may be performed on systems of protection class I only after the protective conductor test has been passed.**

First measured value

The first measured value was already determined and documented in the system leakage current report. The measuring procedure was also recorded.

The measurement was performed with the recorded line voltage, line frequency and with the recorded measuring equipment.

Measurement

Perform the measurement according to DIN VDE 0751, part 1 (see ARTD-002.731.17....), and record the determined value.

The measuring procedure indicated in the report must be used.

If the first measured value has to be newly determined (see note), a measuring procedure can be selected (direct measurement or differential measurement).

Measurement of the system leakage current according to the differential current method (measurement setup according to (Fig. 3 / p. 16)) must be given preference, since this method is not dangerous to the person performing the measurement and other persons.

However, please note the minimum resolution of the leakage current measuring instrument and any additional manufacturer's data restricting the use of the measuring device.

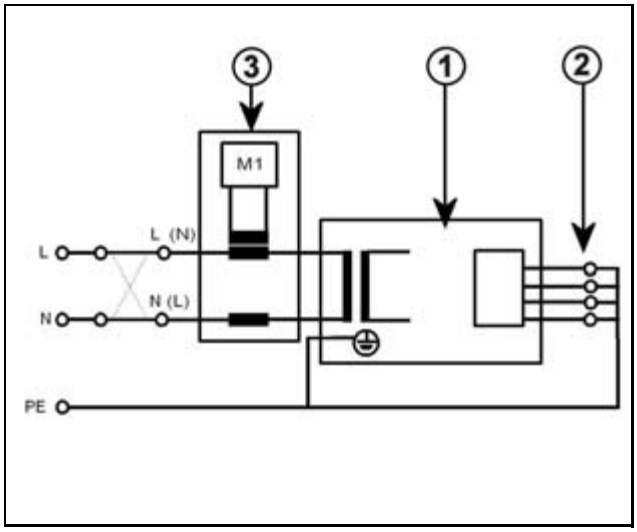

Fig. 3: Measuring circuit for measuring the system leakage current according to the differential current method in compliance with DIN VDE 0751-1:2001-10, Fig. C6 for protection class I.

Pos. 1 System

Pos. 2 Application part (not available)

Pos. 3 Measurement setup (integrated into measuring device)

If the direct measurement of the system leakage current is used (measurement setup according to (Fig. 4 / p. 16)), the system must be insulated during the measurement and must not be touched.

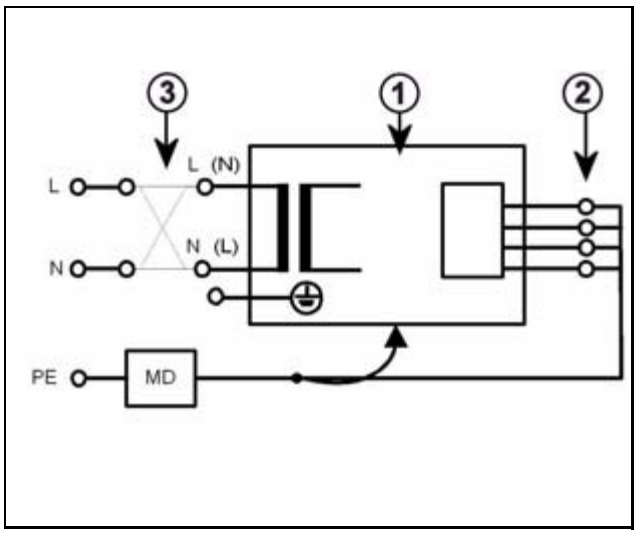

Fig. 4: Measuring circuit for direct measurement of the system leakage current in compliance with DIN VDE 0751-1:2001-10, Fig. C5 for protection class I.

Pos. 1 System
Pos. 2 Application part (not available)
Pos. 3 Measurement setup (integrated into measuring device)

⚠WARNING

Electrical voltage!

Non-compliance can lead to severe injuries and even death.

No housing parts of the system may be touched during direct measurement of the system leakage current (Fig. 4 / p. 16).

➪ **Third-person access to the system must be prevented.**

The system must be switched on during measurement. Measuring devices with automated measuring sequences must therefore be set to manual measurement.

The highest value must be entered in the system leakage current report.

This value must not exceed the permissible leakage current values according to DIN VDE 0751-1:2001-10, Table F.1, line "System leakage current for devices according to remarks 1 and 3", of 2.5 mA.

Measure and record the current line voltage. If the measured line voltage deviates from the nominal voltage, correct the measured value to the value corresponding to a measurement at the nominal value of the line voltage. This is also to be documented.

Document the measuring procedure (differential measurement or direct measurement) and the measuring device used (designation and serial number).

In the case of repeat measurements, the measured value must also be evaluated.

NOTE

Evaluate the results by comparing the first measured value to the corresponding values documented during preceding maintenance procedures or safety checks.

A sudden or unexpected increase of the measured values may indicate that a fault has occurred in the primary circuit of the power supply (damaged insulation, damage caused by water ingress or humidity, defective interference suppressor, etc.) - even if the limit value of 2.5 mA is not exceeded.

The evaluation is not necessary in the case of a new determination.

File the report sheet in the system folder or log book.

1.8 Explanation of abbreviations in the maintenance certificate

Abbrev.	Description
SI	Safety Inspection
SIE	Electrical Safety
SIM	Mechanical Safety
PM	Preventive Maintenance
PMP	Periodic Preventive Maintenance
PMA	Preventive Maintenance Adjustments
PMF	Preventive Check of Operating Values/Functions
Q	System Quality, Image Quality
QIQ	Image Quality
QSQ	System Quality Check
SW	Software Maintenance
CSE	Customer Service Engineer
KSK No.	Customer-specific code
IVK	Installed Volume Component
GR	Maintenance Unit

The steps identified by these abbreviations are part of the maintenance certificate and should be checked off upon completion.

1.9 Maintenance interval

- 12 months

1.10 Technical Safety Checks (TSC)

Abbreviation: TSC = Technical Safety Checks

NOTE

- **Within the purview of DIN VDE 0751-1, the operator of medical engineering products has to perform technical safety checks at regular intervals.**
- **The checks listed in these maintenance instructions contain all technical safety checks according to DIN VDE 0751-1 except for the check of the completeness, presence and legibility of the necessary operator documents.**
- **A separate report with print number SP00.000.834.01... is available for each technical safety check.**
- **Within the purview of DIN VDE 0751-1, we recommend documenting the maintenance results both in the maintenance report and in the TSC report. The reports should be filled out completely and handed over to the client after maintenance is complete.**
- **The table below assigns each technical safety check listed in document SP00.000.834.01... to the corresponding maintenance work.**

Technical safety checks, test protocol of the check	Maintenance instructions for the check/comments
1 Identification data	Please fill in the fields.
2 General checks	n.a.
2.1 Visual inspection: Is there any damage affecting safety?	3. Mechanical safety, checks: SIM Covers SIM Cable deflectors SIM Foot brake SIM Brakes SIM Monitors/displays
2.2 Are all cables and cable guides secure and without any visible damage?	3. Electrical safety, check: SIE Cables and plugs SIE Voltage discharge rubber

Technical safety checks, test protocol of the check	Maintenance instructions for the check/comments
2.3 Are undamaged accessories being used?	3. Mechanical safety, checks: SIM I.I. laser light localizer mechanics SIM I.I. laser light localizer function SIM Laser light localizer mechanics SIM Laser light localizer function SIM Cassette holder SIM Codonics printer mount
2.4 System radiation protection devices present and undamaged? (No on-site radiation shield)	3. Electrical safety, checks: SIE Fluoroscopy timer SIE Audible warning signal SIE Compulsory radiation switch-off SIE Check of the radiation release switches SIE Dose rate SIE Radiation indicators SIE Iris collimator SIE Cassette mount collimator SIE Area dose product measuring unit
2.5 Are the required operator documents complete, present and legible?	Operating instructions must be available. Ask the customer for additional required operator documents and check them for completeness, availability, and legibility.
2.6 Are all warning labels in place and recognizable?	3. Mechanical safety, checks: SIM Warning signs SIM ID labels
2.7 Are the operating symbols, light indicators and button labels OK?	3. Electrical safety, check: SIE Check of the operating functions
3. Electrical checks	n.a.
3.1 Measurement of protective conductor resistance	3. Electrical safety, check: SIE Protective conductor test 5.1 Final work steps, check: SIE Protective conductor test
3.2 Leakage current or equivalent leakage current measurement	n.a.

Technical safety checks, test protocol of the check	Maintenance instructions for the check/comments
3.2.1 Leakage current measurement	3. Electrical safety, check: SIE Leakage current 5.1 Final work steps, check: SIE Leakage current
3.2.2 Equivalent leakage current measurement	n.a.
3.3 Patient leakage current or equivalent patient leakage current measurement	n.a.
3.3.1 Patient leakage current measurement	n.a.
3.3.2 Equivalent patient leakage current measurement	n.a.
4. Mechanical checks	n.a.
4.1 Are all wall, ceiling and floor mountings secure and undamaged?	3. Mechanical safety, check: SIM Monitor(s) / displays
4.2 Are all mechanically moved system parts clean and running smoothly (lubricated, if required)?	3. Mechanical safety, checks: SIM Covers SIM C-arm SIM Lifting column
4.3 Are the wire cables, belts and spindles free of wear and tear?	3. Mechanical safety, checks: SIM Lifting column
4.4 Mobile equipment: Are the wheels, rollers and brakes OK?	3. Mechanical safety, checks: SIM Foot brake SIM Brakes, SIM Wheels
4.5 Is there any unusual noise during operation (e.g., gearing)?	3. Mechanical safety, checks: SIM C-arm SIM Lifting column
5. Functional checks	n.a.
5.1 Function of the Emergency-Stop switch	n.a.
5.2 Are the warning devices functioning properly?	3. Electrical safety, checks: SIE Audible warning signal SIE Radiation indicators
5.3. Do all system movements stop properly in their end positions?	3. Mechanical safety, check: SIM Lifting column

Technical safety checks, test protocol of the check	Maintenance instructions for the check/comments
5.4 Does the collision protection device stop all system movements properly (e.g., collision protection)?	Check the collision protection, if installed. Otherwise: n.a.
5.5. Are all safety distances (wall, floor, ceiling) met or ensured by other appropriate measures (such as light barriers)?	Check the measures provided if they are installed. Otherwise: n.a.
5.6. Are the other safety shutdown devices functioning properly (e.g., safety floor plate)?	Check the measures if they are installed. Otherwise: n.a.
5.7 Are the positions of the table and system reproducible (e.g., zero positions, layer height, etc.)?	n.a.
6. Product-specific checks	3. Electrical safety, checks: SIE IQ quick test SIM Codonics printer IQ test
7. Test result/evaluation:	Evaluate the long-term trends of the protective conductor resistance and the leakage current by comparing the current measuring values to those of the preceding technical safety checks. A sudden or unexpected increase in the measured values may indicate a safety-related defect - even if the limit values are not exceeded. Follow the instructions for checks in the section on final work steps. Enter the results of the check. Have the operator, or a person authorized by the operator, sign the TSC report. Hand the TSC report over to the operator, or a person authorized by the operator.

2 Inspection of Exterior and Surroundings

2.1 Visual inspection of exterior

PMP Damage to the system

- Inspect the entire system for damage, such as damage to the housing or paint.

PMP Damage to the mains connection

- Check available power cables, plugs, socket plates and sockets for damage.

2.2 Inspection of environment

2.2.1 Power outlets

SIE Damage

- Inspect the power outlets used for system operation for damage.

SIE Mains voltage

- Measure the line voltage and compare it to the line voltage label on the monitor trolley.

SIE Internal line impedance

- Measure the internal line impedance.

3 Safety Inspection

3.1 Mechanical safety

SIM Cover panels

- Remove the covers from the SIREMOBIL stand and monitor trolley.
- Check cover panels for damage.

SIM Cable deflectors

- Inspect the cable deflectors on the stand and on the monitor trolley.

SIM Cassette holders

- Inspect the cassette holders for mechanical damage.
- Install the cassette holder on the I.I. Ensure that it locks into place properly.

SIM Foot brake

- Test the function of the foot brakes on the SIREMOBIL stand and monitor trolley on a level floor.

SIM Brakes

- Using the spring balance, check whether the orbital brake, angulation brake and horizontal lift brake achieve the specified braking values in both braked and unbraked states.

SIM C-arm

- Perform all C-arm movements, checking for slackness of the bearings and bearing noises.

SIM Wheels

- Move the SIREMOBIL in a straight line on a level floor.
- Evaluate the straight and quiet movement of the SIREMOBIL.
- Replace any defective wheels or castors.
- Check the steering function.

SIM Lifting column

- Switch the system on
- Electrically raise and lower the lifting column,
  - while listening for noises and checking for play in the bearings.
  - The lifting column movement must switch off automatically when the end positions are reached.
- Switch off the system.
- Lubricate the lifting column.
  - Move the lifting column approx. 20 cm in an upward direction for this purpose. Remove the plastic cap.
  - Oil the spindle (approx. 2 cm^3 special oil).

3.1.1 I.I. laser light localizer

SIM Mechanical system

- Inspect the I.I. laser light localizer for mechanical damage.
- Mount the I.I. laser light localizer on the I.I. and ensure proper locking and seating. When doing this, pay special attention to the tension band and its closure.
- Check the I.I. ring for damage.

SIM Function

- Perform maintenance on the I.I. laser light localizer according to Installation and Setting Instructions RXR2-130.033.03...

3.1.2 Laser light localizer

SIM Mechanical system

- Inspect the I.I. cap of the laser light localizer for mechanical damage.
- Install the I.I. cap of the laser light localizer on the I.I. and ensure proper locking and seating.
- Check the I.I. ring for damage.

SIM Function

- Perform maintenance on the laser light localizer according to Setting Instructions RXR2-130.032.01...

3.1.3 Codonics printer

SIM Mounting

- Inspect the screws used to fasten the guide rail to the mounting bracket of the Framegrabber.
- Ensure that the printer is properly fastened to the guide rail. Make sure there are no missing attachment screws.
- Ensure that the Framegrabber is properly fastened to the mounting bracket. Make sure there are no missing attachment screws.

SIM Guide rails

- Inspect the guide rails for proper function and smooth operation.
- The guide rails must not be damaged.
- The guide rails must lock properly into place when fully pushed into position.
- If necessary, use a cleaning brush to remove dirt from the rails.

3.1.4 Monitor(s)/displays

SIM Monitor/displays

- Check the monitor(s) and/or displays for damage.
- Ensure that the monitor(s) or displays are correctly mounted to the monitor trolley.

3.1.5 Labels

SIM Warning signs

- Ensure that all required warning labels are attached and in good condition.
  - Replace any illegible labels or markings.

SIM ID labels

- Ensure that all required ID labels are attached and in good condition.
  - Replace any illegible labels or markings.

3.2 Electrical safety

SIE Cables and plugs

- Check visible system cables and plugs for damage.

SIE Fluoroscopy timer

- Check: See section on "Compulsory radiation switch off".

SIE Audible warning signal

- Check: See section on "Compulsory radiation switch off".

SIE Radiation indicators

- Check: See section on "Compulsory radiation switch off".

SIE Radiation release switch

- Check: See section on "Compulsory radiation switch off".

SIE Compulsory radiation switch off

Test the functioning of the audible warning signal and compulsory radiation switch off (if required) according to the country-specific regulations. Then perform the following checks:

- Release fluoroscopy for one minute. Check the fluoroscopic timer with a wrist watch for correct functioning.
- All radiation indicators on the system operating console as well as the monitor trolley must illuminate while radiation is released.

- Check the functioning of the radiation release switches (hand and foot switches).
- Inspect the radiation release switches for mechanical damage.
- Check the cables of the hand and foot switches for mechanical damage.
- Move the cables of the hand and foot switches to check for breaks and short circuits.

NOTE

- **Depending on the programming, the audible warning signal has to sound 4.5, 5 or 9.5 minutes after the fluoroscopy has started. It sounds again every 5 or 10 minutes. It is turned off by pressing the -0- button once.**
- **Pressing this button again resets the fluoroscopic timer to "0".**
- **Depending on the country-specific programming, either the required radiation shut off does not occur or it occurs every 5 or 10 minutes and then every 5 or 10 minutes after that.**

SIE Dose rate

- Switch the system on
- Check the dose rate (see the SIREMOBIL Compact service instructions for this purpose).

SIE Iris collimator

- Check the iris collimator and correct it if necessary.
  - Select the full I.I. format and release fluoroscopy briefly.
  - The collimator blades must be clearly visible at the edges of the image.
  - Select a zoom format and release fluoroscopy briefly.
  - The collimator blades must be clearly visible at the edges of the image.

SIE Cassette mount collimator

- Check cassette mount collimator.
  - Attach the cassette holder with the cassette and film to the I.I.
  - The iris diaphragm opens fully when the cassette is inserted.
  - The mA display switches to mAs in the exposure data field and the operation indicator switches off.
  - Release an exposure using 40 kV and 5 mAs and develop the film.
    ➪ The iris blades should be parallel to the edges of the film and should be visible on all 4 edges of the film.
  - When the iris diaphragm buttons are pressed simultaneously, the diaphragm moves to the size previously set in fluoroscopy mode.

SIE Area-dose product measuring device

- Check area-dose product measuring device.
- (see the SIREMOBIL Compact service instructions for this purpose).

SIE Codonics printer cable breakage

- Inspect all connection lines between the printer and the Framegrabber for damage and breaks. Inspect the cable routing of the energy chain for damage and proper functionality (ensure that none of the cables are pinched).

3.2.1 Monitor(s)/displays

SIE Monitor/displays

- Check the SIMOMED N monitors as prescribed in the checklist.
- Check the luminance of the standard monitors with 100/120 Hz.
- Check the luminance of the TFT displays. Check the ambient light sensor.

3.3 Operation

SIE Check the operating functions.

- Check whether the operating icons and button labels are clearly legible and recognizable.
- Check whether the light indicators of the operating elements and displays are properly functioning.
- Check all system operating functions.

3.4 Voltage discharge rubber

SIE SIREMOBIL stand voltage discharge rubber

- Inspect the voltage discharge rubber on the SIREMOBIL stand for damage or dirt. If necessary, clean or replace it.

SIE Monitor trolley voltage discharge rubber

- Inspect the voltage discharge rubber on the monitor trolley for damage or dirt. If necessary, clean or replace it.

3.5 Measurements

SIE **Protective conductor test (performed under "Final Worksteps")**

- Test the protective conductor with the ground wire tester according to **ARTD-002.731.17...** .
- The protective conductor resistance must not exceed 0.2 ohms.

NOTE

The protective conductor test is part of the safety inspection. However, it cannot be performed until all maintenance work has been completed. See (Final work steps / p. 38).

SIE **Leakage current test (performed under "Final Worksteps")**

- Perform the equivalent leakage current test with the system closed according to **ARTD-002.731.17...**. Document and evaluate the determined values. Document the measuring procedure. The equivalent leakage current must not exceed 2.5 mA.

NOTE

The equivalent leakage current test is part of the safety inspection. However, it is recommended to be performed only at the end of maintenance, with the system closed. See (Final work steps / p. 38).

4 Maintenance, Operating Value/ Functional Inspection

4.1 Maintenance

PMP Cleaning the system

- Clean the entire system:
  - Visible cables
  - Exterior surfaces
  - Contact surface of wheels
  - Interior space

PMP System ventilation

- Clean the ventilation slots of the SIREMOBIL stand and monitor trolley.

PMP Memoskop ventilation

- Clean the ventilation slots on the Memoskop.
- Check that the fan is functioning properly.

4.1.1 Codonics printer

PMP Ventilation

- Clean the ventilation slots of the printer and Framegrabber.
- Check that the fan is functioning properly.

PMP Cleaning

NOTE

According to the EP1660 user manual, it is the responsibility of the customer to clean the thermal print head and the mechanics for film transport. The interval between cleanings is also specified in the user manual. Refer to the maintenance chapter for the Codonics printer.The annual cleaning of the printer described here is not a substitute for regular maintenance by the customer. In the event that malfunctions occur or image quality worsens due to insufficient cleaning, please refer the customer to the maintenance activities/interval described in the Codonics user manual.

⚠WARNING

Danger of burns!

➪ **Allow the thermal print head to cool off before cleaning!**

- Clean the printer as described in the maintenance chapter of the Codonics user manual. Use the customer's cleaning pads (some cleaning pads are included in the delivery volume of the printer).

4.2 Operating value inspection

PMF Error memory

- Read out the error memory of the system and analyze the results.

4.3 Functional inspection

PMF Video printer

- Check the function of the video recorder.
- Check the remote control (Print button).

PMF Video recorder

- Check the function of the video recorder.
- Check the remote control (REC-Pause-Start / REC-Pause-Stop).

PMF Laser camera system "Sneaker Net"

- Check the function of the laser-camera system “Sneaker Net”.

PMF DICOM Connect

- Check the function of the DICOM Connect network connection.

PMF Codonics printer manual control panel

- Check the function of the printer.
- Check the function of the manual control panel.
- Inspect the cable of the manual control panel for damage and breaks.

PMF Laser camera connection

- Check the functioning of the laser camera connection.
- Check the remote control (Print button).

PMF Image rotation

Check the image rotation (camera rotation).

- Check the 0° setting and the entire rotational range (± 220°) under fluoroscopy.
- Check the pre-display of the image rotation.

PMF Slot diaphragm

- Select I.I. full format.
- Open the slot diaphragm completely and release fluoroscopy briefly.

  The slot diaphragm blades are no longer visible on the screen.

- Select I.I. zoom format.
- Release fluoroscopy briefly.

  The slot diaphragm blades are no longer visible on the edge of the image.

- Close the slot diaphragm.

  Rotate the slot diaphragm ± 360° under fluoroscopy. The slot diaphragm will rotate 360°.

5 Final Result / Quality Inspection and General Maintenance

SIE Image quality (IQ) quick test

- Perform the SIREMOBIL Compact IQ quick test.
- Include additional additional monitors / displays in this test.

SIE Codonics printer IQ test

- Inspect the image quality according to the chapter “Testing the image quality” in the installation instructions SPR2-130.814.01...

PMP Maintenance

- Entire system: Touch up any paint damage as needed.

5.1 Final work steps

SIE Protective conductor test

SIE Protective conductor resistance

- Perform the protective conductor test with the system closed according to **ARTD-002.731.17....** **Document and evaluate the determined values.** The protective conductor resistance must not exceed 0.2 Ohms.

NOTE

Evaluate the results by comparing the first measured value to the corresponding values documented during preceding maintenance procedures or safety checks.

A sudden or unexpected increase in the measured values may indicate a defect in the ground wire connections (protective conductor or contacts) - even if the limit value of 0.2 Ohms is not exceeded.

SIE Leakage current

- Measure the leakage current according to **ARTD-002.731.17**. Document and evaluate the determined values. The limit value of 2.5 mA may not be exceeded.

NOTE

Evaluate the results by comparing the first measured value to the corresponding values documented during preceding maintenance procedures or safety checks.

A sudden or unexpected increase of the measured values may indicate that a fault has occurred in the primary circuit of the power supply (damaged insulation, damage caused by water ingress or humidity, defective interference suppressor, etc.) - even if the limit value of 2.5 mA is not exceeded.

6 Changes to Previous Version

Document was converted to DMS